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Adhesive binding of paper.

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A method of forming an adhesively bound block of paper sheets is described, in which the binding edge margins (7') of the sheets are abraded to a rough surface by a rotating wire brush 3, or abrasive belt or roller, before binding to provide a good key for the adhesive. The binding edge margins of the sheets may simply be roughened, or they may be abraded to a desired profile.

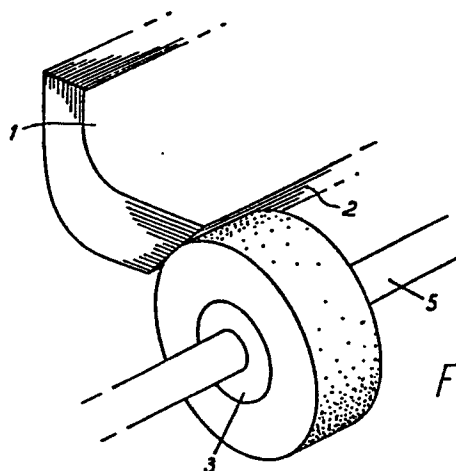


FIG. 1

ADHESIVE BINDING OF PAPER

The invention relates to the production of paper blocks by adhesive binding along a bound edge of a stack of sheets, for example for book binding or the binding of paper sheets into blocks of writing paper or forms.

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This method of binding paper leaves together into a block is known as adhesive, unsewn, threadless or, in the U.S.A., perfect binding. It is widely used in the binding of books, particularly paper-back books, and in the manufacture of blocks of writing paper and other 'tear-off' pads.

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Prior art adhesive binding methods for forming a plurality of sheets of paper into a bound block by application of adhesive along binding edges of the sheet comprise forming the sheets into a block, milling the spine of the block and applying a layer of adhesive to the milled spine.

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This method, whilst cheaper than sewn binding, suffers from the disadvantage that the sheets in the block may become detached too easily, particularly in the case of books and pamphlets made from coated paper having for example a glossy finish.

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According to the invention, the margins adjacent the binding edges of the sheets of paper to be bound are abraded to expose at least one roughened surface before the application of adhesive thereto.

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There is further provided, in accordance with the invention, a bound block comprising a stack of sheets of paper, each sheet having a binding edge, and the margin adjacent the binding edge of each sheet being abraded on at least one surface, the stack of sheets being bound together along the binding edges of the sheets by adhesive.

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The invention will be further described, by way of example, with reference to the drawings, in which:

Fig. 1 is a diagrammatic representation of apparatus for carrying out a first method according to the invention;

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Fig. 2 is a diagrammatic representation of apparatus for carrying out a second method according to the invention;

Fig. 3a and 3b each show a cross-section through a portion of a block of sheets after abrasion by the apparatus of Fig. 1;

Fig. 4 shows a cross-section through a sheet after abrasion by the apparatus of Fig. 2; and

Fig. 5a to e show profiles of sheets used in methods according to the invention.

Fig. 1 shows a block 1 of sheets of paper held, by means not shown, and curved so that, at the binding edgew 2 of the block, the binding edges of the sheets are staggered to expose the binding edge margin of each sheet to a wire brush 3, which is in contact with the binding edge of the block 1. The wire brush 3 rotates on a shaft 5 to abrade one side of the exposed margins of each sheet in the block.

The wire brush 3 may be narrower than the length of the binding edge 2 of the block 1, in which case the block is moved lengthways so that the whole length of the edge is abraded. An abrasive belt or roller may be used in place of the wire brush.

Treatment of the block 1 in this way results in the sheet margins having a profile such as shown in Figs. 3a and 5a. The sheets of paper 7, which here comprise base paper 9 and surface coatings 11, are abraded at an acute angle, by virtue of the curved configuration in which the block is held during abrading, to form an inclined surface 10 which is roughened and fibrous. Such a surface provides a key for the adhesive which is subsequently applied to the abraded block. The binding edge margin 7' of the sheet 7 before abrading is shown by a broken line.

The binding edge margin of each side of the sheet 7 may be abraded to an inclined surface, to provide the profile 12 shown in Figs. 3b and 5b, by reversing the

direction of rotation of the wire brush 3 during abrasion of the block 1 and curving the block 1 in the opposite direction to expose the binding edge margin of the opposite sides of the sheets. Again, the binding edge margin 7' of the sheet 7 before abrading is shown by a broken line.

If the block 1 is formed of folded sheet in which the fold lines lie along the binding edge 2 of the block, the folds may be cut from the block by a knife or milling cutter, before or after abrasion.

The apparatus shown in Fig. 2 serves for use in another method according to the invention. In this method, the binding edge margins of the sheets are abraded whilst they are still united in the form of an uncut web 13. The web 13 consists of a continuous sheet on which, in the case of book manufacture, the pages are printed so that the binding edges of the pages in each column are aligned.

Grinding wheels 30 are arranged for rotation, in contact with the web 13, so that, as the web passes beneath them, they abrade the surface thereof along the binding edge margins of the pages, to form shallow troughs 15 in the web.

Preferably, the pages are arranged on the web so that pairs of sheets are aligned binding edge to binding edge across the web. In this case, each grinding wheel 30 abrades the binding edge margins of two pages.

The abraded web is then cut and folded in the usual manner prior to application of adhesive to a block of the cut and collated pages.

A cross-section through a portion of the abraded web is shown in Fig. 4. The surface coating 11 of the web 13 is removed from one side of the web to form a trough 15 in which the base paper 9 is exposed to provide a roughened surface.

Abrasion of the web 13 in this way produces, after

cutting, sheets of paper having the profile shown in Fig. 5c, that is having a rebate 17 along the binding edge margin of the sheet 7.

If desired, a doubly rebated profile 19, shown in Fig. 5d, may be imparted to the sheets 7, whilst in web form, by abrading the web with pairs of grinding wheels 30 aligned on either side of the web 13.

It may be sufficient, particularly in the case of coated paper sheets, merely to roughen the surface of the binding edge margin of the sheets, as shown in Fig. 5e, without removing a significant quantity of the surface of the sheet.

In Figs. 5c and 5d the binding edge margin 7' of the sheet 7 before abrading is shown by a broken line.

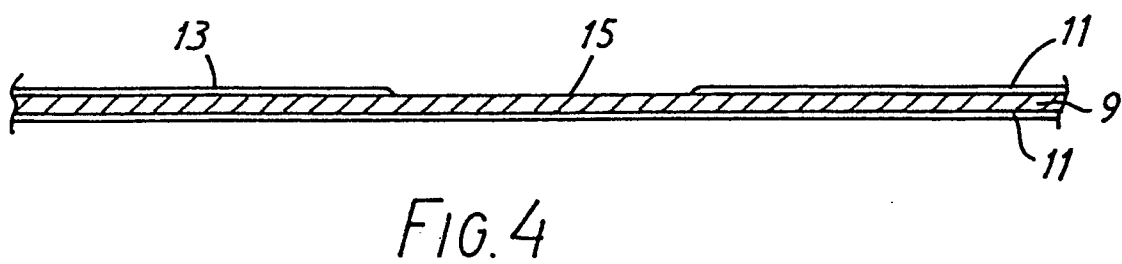
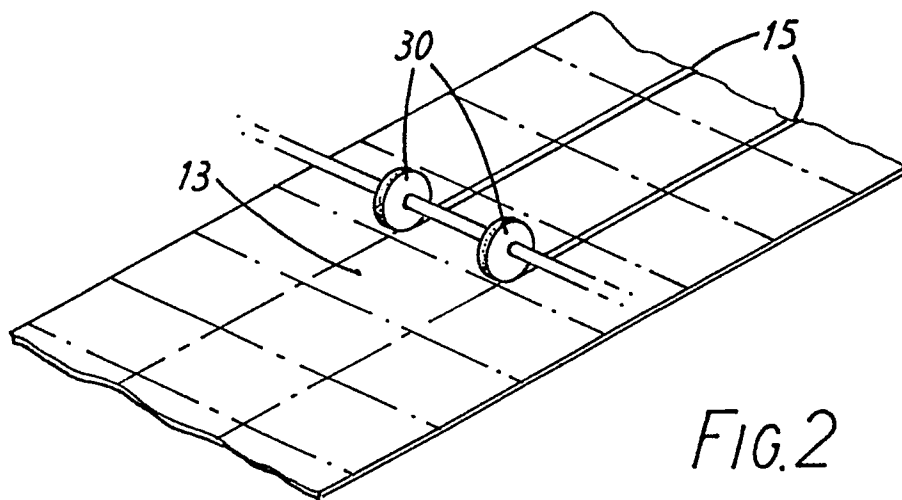
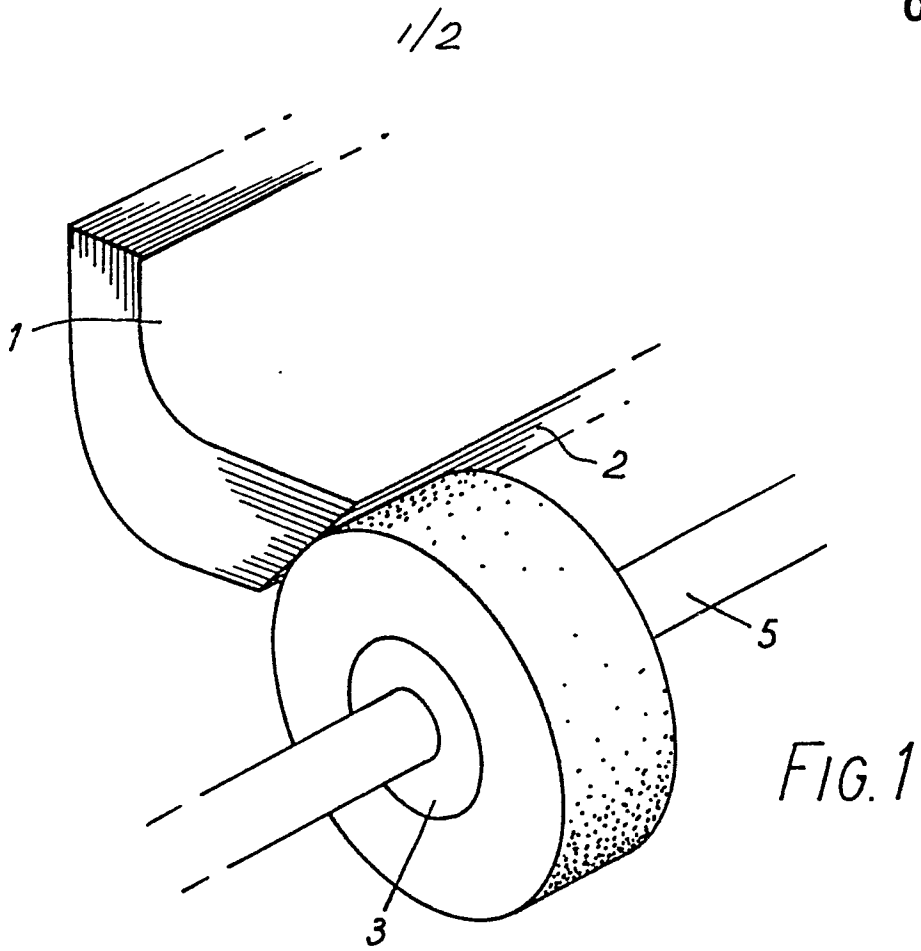
The width of the abraded binding edge margins is preferably less than 2mm. In the case of folded sheets which are abraded prior to cutting of the folds, the abraded portions, which lie across the fold, may be wider, for example up to 10mm. When the folds are subsequently cut, some of the abraded portions are removed to leave abraded binding edge margins preferably less than 2mm in width.

After the binding edge margins have been abraded, and, if necessary, the sheets have been cut and collated, the block is bound in the normal way by application of adhesive to the binding edge. The abraded binding edge margins of the sheets, in which the paper fibres are exposed and may stand up from the abraded surface, provide a better key for the adhesive than untreated paper, and a longer lasting bond is formed between the sheets. The invention finds particular application in the case of blocks to be bonded by hot melt adhesive, but it may be used in any type of adhesive binding process.

1. A method for forming a plurality of sheets of paper into a bound block by application of adhesive along binding edges of the sheets (7), characterised in that the margins (7') adjacent the binding edges of the sheets are abraded to expose at least one roughened surface before the application of adhesive thereto.
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2. A method according to claim 1 in which the binding edge of each one of a stack of sheets (7) is staggered to expose the margins (7') adjacent the binding edges.
3. A method according to claim 2 in which the stack of sheets (7) is clamped at a region spaced from the binding edges, and the intervening portions of the sheets are curved to stagger the margins (7') adjacent the binding edges.
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4. A method according to claim 1 in which the sheets (7) are in the form of a longitudinally moving web (13), the binding edges of adjacent sheets along the web being aligned.
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5. A method according to claim 4 in which pairs of adjacent sheets (7) across the web (13) are united along their binding edges so that the margins (7') adjacent the binding edges of each sheet of a pair may be abraded in one operation.
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6. A bound block comprising a stack of sheets (7) of paper, each sheet having a binding edge, and the margin (7') adjacent the binding edge of each sheet being abraded on at least one surface, the stack of sheets being bound together along the binding edges of the sheets by adhesive.
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7. A method substantially as described, with reference to Figures 1 and 2 of the drawings.

8. A bound block substantially as described, with reference to Figures 3a, 3b, 4, 5a, 5b, 5c, 5d and 5e of the drawings.



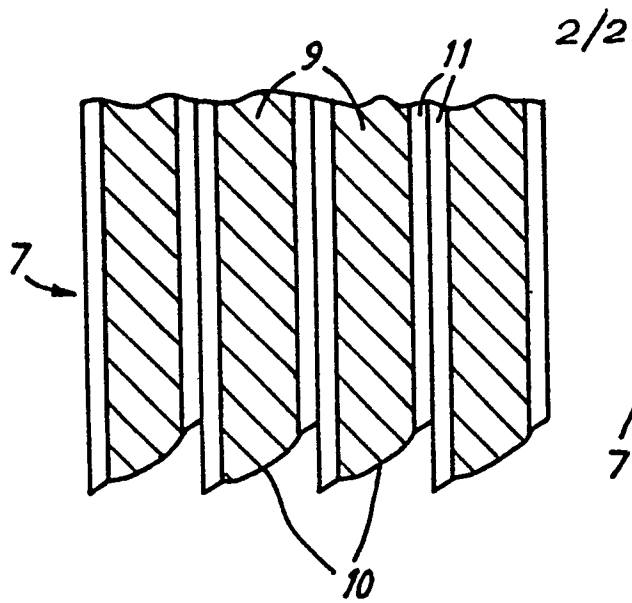


FIG. 3a

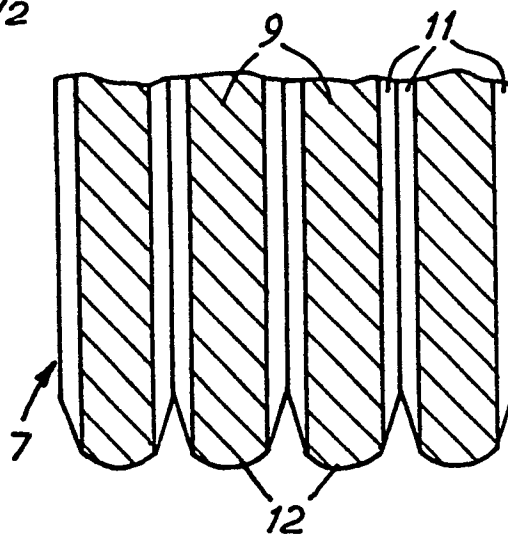


FIG. 3b

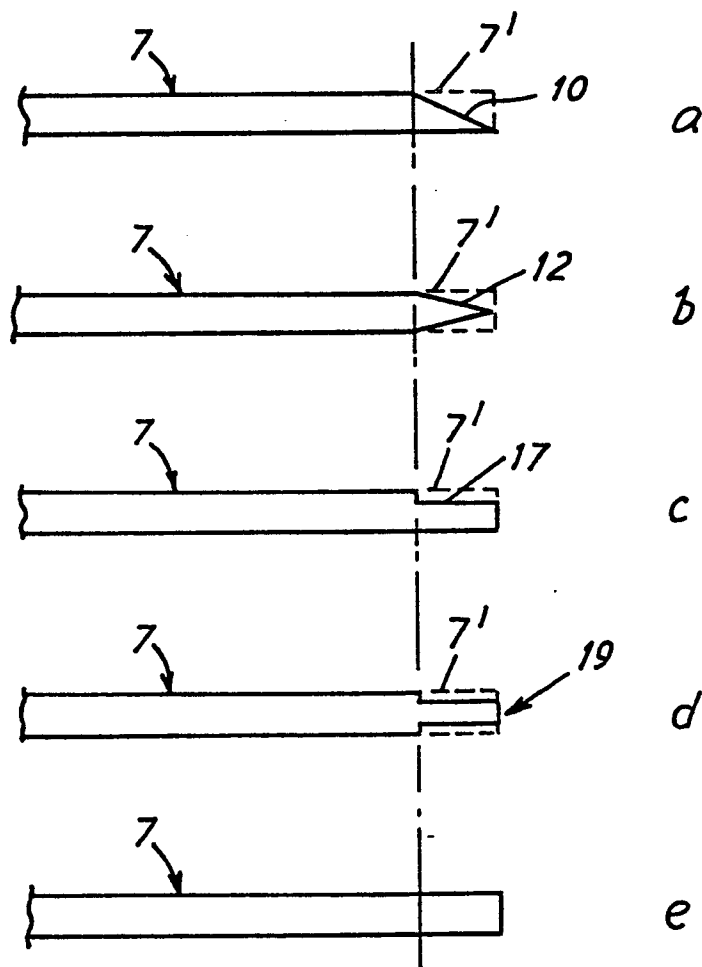


FIG. 5